Design Memorandum No. 06-2003

TO: Engineering Offices and Divisions
Districts
Consulting Engineers

FROM: Mark Gaydos, Design Engineer

DATE: April 21, 2003

SUBJECT: RECOVERY APPROACHES

Design Manual Reference:

Section III-02

____ Revision
__°__ Supplemental

Introduction
This memorandum provides guidance on the design of Recovery Approaches at T-intersections.

Implementation
The use of this guidance is to be implemented immediately.

Guidance
North Dakota Century Code, Section 24-01-49, states: "Approach or escape road to be built at all dead end roads or intersection of county and state highways. Whenever any highway on the state or county highway system has an intersection or dead end, there must be constructed, whenever feasible, an approach or escape road, and when not feasible other protective devices such as warning signs, rumble strips, or barricades. This section applies to new road construction and reconstruction after July 1, 1975."

Intersection conditions where the construction of a recovery approach is not feasible must be discussed in the project concept report. The determination not to construct a recovery approach should be a decision item for approval by the Deputy Director for Engineering. Unfeasible conditions usually involve other roadway hazards such as: recovery approach that would lead into a lake, wetlands, rip-rap, steep back slope, deep ravine, or when extreme amounts of fill and right-of-way are needed. Note that some small wetlands can safely be traversed by the recovery approach.

Signing and/or rumble strips will be included in the intersection design when the Traffic Operations Section, Planning and Programming Division, has identified a crash problem.

There are 4 design scenarios for T-intersections:

1. A recovery approach will be constructed at all T-intersections of county and state highways, unless it is not feasible.

2. If a recovery approach is not feasible and a crash problem has not been identified, the intersection will be signed with intersection warning signs, Two-Direction Large Arrow sign (W1-7) and the T-Symbol sign (W2-4).

3. If a recovery approach is not feasible and a crash problem has been identified, the intersection will be signed with intersection warning signs, Two-Direction Large Arrow sign (W1-7) and the T-Symbol sign (W2-4), and rumble strips may be installed as shown on standard drawing D-960-1.

4. If a recovery approach is feasible and a crash problem has been identified, a recovery approach will be constructed. The intersection will be signed with intersection warning signs, W1-7 and W2-4 and rumble strips may be installed as shown on standard drawing D-960-1.

If a recovery approach is constructed a 90-1 Survey should be conducted to determine what other safety work should be done to the approaching county or state highway (Example: flattening of inslopes, relocation of pipes out of the clear zone)

The attached standard drawing, D-203-7, has been developed to give guidance on the width, grade, radius and location of recovery approaches in relation to the approaching highway. In addition there is a drawing showing the signing requirements for a T-intersection.

The Traffic Operations Section, Planning and Programming Division, will provide the crash analyses and traffic control device recommendations.

Questions
Any question regarding the content or implementation of this memorandum should be referred to Ronald J. Henke, Design Division, 701-328-4445.

Approved

Signed — 5/06/2003

Francis G. Ziegler, P.E. - Director, Office of Project Developement — Date

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attachment
c: FHWA

STATE AND COUNTY ROUTE AT T-TYPE INTERSECTIONS

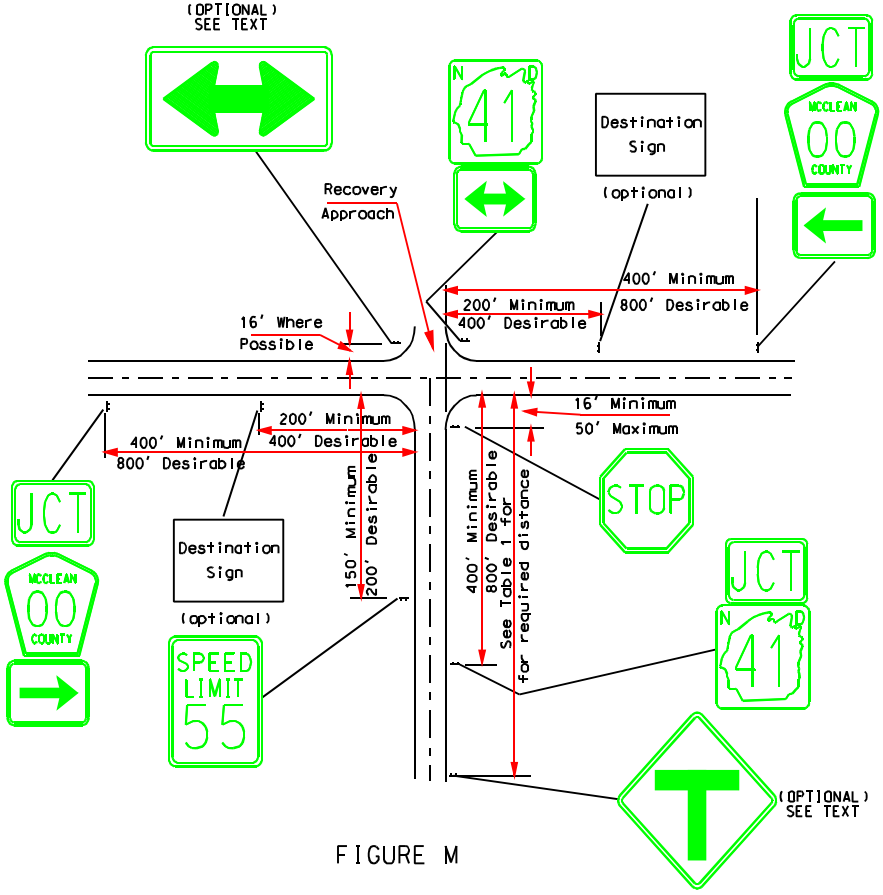


FIGURE M

USE OF THE STOP AHEAD SIGN

Engineering judgement should be used to determine where the warning sign for a STOP AHEAD is to be used.

It should always be used where the STOP sign and the intersection are not visible for sufficient distance because of a horizontal curve or grade on the approach roadway. Other factors such as crash experience or reported incidence concerning violations of the stop control, and the background beyond the intersection would require the use of the STOP AHEAD sign.

URBAN HIGHWAY JUNCTIONS

In urban areas where speeds are low the spacing requirements shown for these rural intersection may b e reduced to a minimum of 100 feet between signs. The route turn sign may be placed within 50 feet of the intersection where no STOP sign exists. In some instances in urban areas the curb to right-of-way or curb to side walk is to accommodate some of the larger signs or where viewing may be obstructed, it may be necessary to eliminate a destination sign or, in the case of the distance sign, it may be necessary to place the sign further down the road or at the edge of the city.

SIGN VISIBILITY AT HIGHWAY JUNCTIONS

Each sign in the junction identification sequence should be visible and unobstructed. Special attention should be given to the location and visibility of the STOP signs at highway junctions since this is the most important traffic control message.

After the proper position of the STOP sign has been determined the remaining signs in the sequence in advance of the STOP sign should be placed in an offset position that the STOP sign will be visible a distance at least equal to the minimum sight distance, when viewed from the outside edge of the driving lane on the approach roadway (850 feet at 70 mph). Remember to increase this distance where the approach roadway is on a down grade.

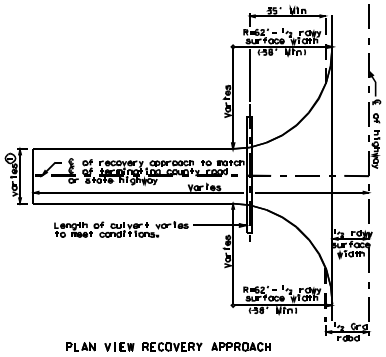
Where the route marker turn assembly is mounted on the far side of the intersection, care should be taken to position the signs so they do not interfere with the visibility of the motorists on the stopped approach.

Revised 5 - 06 - 03

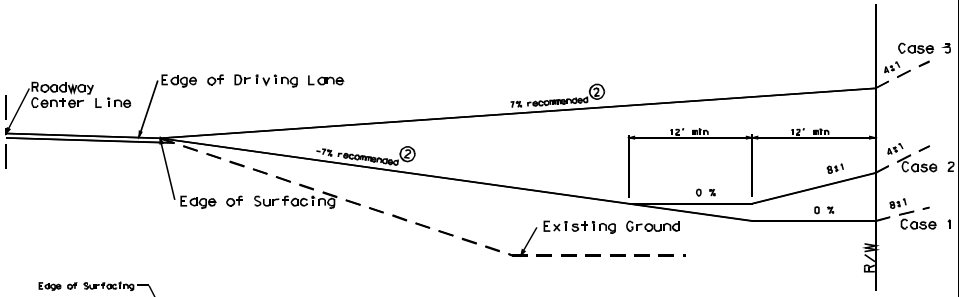
D-203-7

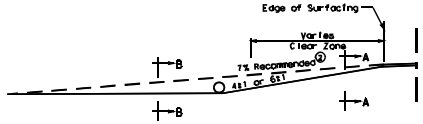
RECOVERY APPROACHES AT T-INTERSECTIONS

(Rural T-intersections)

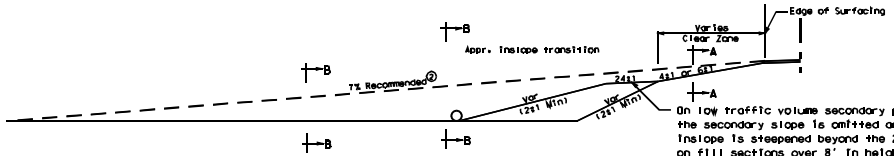


PLAN VIEW RECOVERY APPROACH

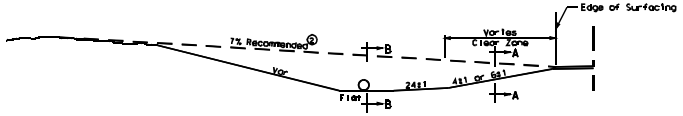




RECOVERY APPROACH GRADE ON FILL SECTON 12 FEET OR LESS



RECOVERY APPROACH GRADE ON FILL SECTON OVER 12 FEET



APPROACH GRADE ON CUT SECTION

Case 1. Ties into existing back slope and within existing right of way. Existing Back Slope is 8:1 or flatter.

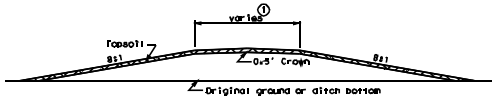
Case 2. Ties into existing back slope and within existing right of way. Existing Back Slope is 4:1 or flatter.

Case 3. Ties into existing back slope and within existing right of way. Existing Back Slope is 4:1 or flatter.

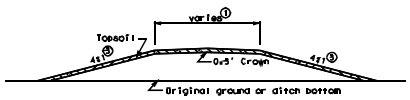
NOTE: For terminating road inslope flattening within clear zone refer to "Approach Slope Flattening" detail shown in the plans.

FOOT NOTES

① Width of recovery approach to match width of terminating county road or state highway
② 10% Max
③ 3:1 Slope - 20'to 30' fill
2:1 Slope on fills over 30'



SECTION A-A



SECTION B-B

4-25-03 REVISIONS	
DATE	CHANGE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

APPROVED: _____ DESIGN ENGINEER